

This reminded me about a similar observation I had made earlier [*Nature* (1988) Vol.332, p.296]. Apparently, none of the many distinguished scientists appeared to have realised the significance of the above statement as there was no further discussion on what he said. However, the significance is obvious because if one looks at the major cases of scientific misconduct in India, one will realise that what he said is quite true. In fact, in this connection, one could say that great disservice to Indian science has been done in the past by certain foreign scientists.

It is not the purpose of this lecture to talk about scientific misconduct *per se* but to deal with the specific issue about how we in India should evaluate the work done by Indian scientists. Evaluation of work by scientists is not a matter of concern only to India. It is a problem for all countries with major investments in science and technology. The problem has arisen because during the past fifty years, universities and other organisations where scientific research is done have departed from the traditional 19th century (and earlier) practices followed in the pursuit of scientific enquiries. Pursuit of new knowledge and getting it first was an end in itself in the 'old days', but now it is essentially a means to an end. (Lucky are those who are allowed to keep to the old system!). New scientific knowledge provides power and can bring wealth at a much faster rate than before and so the temptation to judge scientists in terms of the economic and social returns of their work is great. It is a temptation that all organisations that provide financial support and government agencies concerned with the promotion of science have fallen a prey to. It is only in Third World countries one sees the promotion of pursuit of science for its own sake like the promotion of basic research on a priority basis and so on. Thus, it is no surprise that scientists in India still tend to be judged on the basis of their contributions in the fundamental fields of science. It is not uncommon to find CV's of individuals containing lists of papers published in Indian journals and foreign journals separately and along with it the lists of citations of their various papers. This system provides some sort of numerical data and seems to

absolve them of the need to state what contributions they have made to new knowledge or to society through the work they have done. One comes across more and more scientists who wish to be assessed in terms of the citations of their papers, a situation that also prevails in several other countries. As far as India is concerned, in my view, it is unwise to popularise citation lists as guidelines. The reasons are simple. In Western countries the relevant research to do is the one that is of current interest, work in frontier areas and work that is of value for producing useful products and technology which, in turn, will bring economic benefits. Therefore if one works in a fashionable field and one has some new information, say on a new substance of interest to many other scientists working that field, then it follows that the papers highlighting this substance will be cited by those working in the same field; and the number of people working this field will be many. Thus one will end up with many citations and this fact can be put forward for purposes of favourable assessment of one's worthiness in science. However, as a *general rule*, it is quite out of place on the one hand and it undermines the far more useful work in more urgent fields (of no value to the West), on the other. For example, take the case of a scientist working in the field of leprosy or tuberculosis which are of only minor interest in the West. Even though very valuable new information may be obtained by a scientist working in these fields, it is obvious that his papers will not be cited by many authors. It is therefore only fair that such scientists are assessed on the basis of other criteria such as usefulness of their work to Indian S&T and social value. It is also important not to commit the opposite mistake of assessing all work by everyone by the latter criteria. Each set of criteria has its own place. Thus, for work in frontier areas, one could use citations as one of the indications and for need-based research, one could use another set of criteria. In fact, by a judicious mix of these criteria it should be possible to make a fair judgement about whether the best 'tomato' is better than the best 'potato', because that is the sort of judgement that one has to make in some cases—even in the same Institute.

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